**Application of Life Stage–Specific Data in the Risk Assessment for Children: Case Study Presentation Using Pesticides**

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The Office of Research and Development (ORD) has been instrumental in developing a number of tools (including risk assessment guidelines, testing guidelines, guidance documents, and workshops) that have had a critically positive impact on pesticide risk assessment in EPA's Program Offices. These efforts have generally been conducted as collaborative inter-office working group projects under ORD leadership.

In addition to the generic development of guidance for risk assessment, ORD has contributed to the risk assessments of specific individual pesticides or classes of pesticides through test methods development, the generation of data, and consultation with the Program Offices, providing scientific information and expertise informing the risk assessment process. Example cases in which ORD input was essential to the interpretation of life stage–specific susceptibility and was critical to the assessment of risk to children's health are chlorpyrifos and atrazine, two widely used pesticides with documented potential for exposure to children. Extensive collaboration and consultation between ORD and the Program Offices occurred during the process of developing the risk assessments. Research conducted or supported by ORD contributed to the characterization of life stage–specific susceptibility issues for each of these two chemicals. In the case of chlorpyrifos, ORD scientists conducted laboratory studies to characterize the age-related sensitivity to cholinesterase inhibition and developed tools to assess children's exposures to chlorpyrifos. For atrazine, seminal health effects research was conducted by ORD scientists to identify the critical non-cancer mode of action for risk assessment, that is, disruption to the hypothalamic–pituitary–gonadal axis during development. Overall, for these two pesticides, ORD studies provided confirmation of susceptibility to the young, support for decisions regarding the adverse consequences of the observed effects, a basis for extrapolation from animal data to potential human response, methodologies to assess exposure to children, and information critical in identifying the point of departure for risk assessments conducted by the Office of Pesticide Programs and the Office of Water.

This research program reduced uncertainty in risk assessment and had an impact on the Agency risk management decisions to protect susceptible populations for both chlorpyrifos and atrazine. Residential uses of chlorpyrifos were cancelled in mitigation efforts that became effective in 2001. Earlier Centers for Disease Control and Prevention (CDC) biomonitoring studies suggest

that levels of urinary metabolites that are indicative of chlorpyrifos exposure were lower in the 1999–2000 period compared with the 1988–1994 period. Additionally, in an ORD Science To Achieve Results (STAR) grant–supported study of an urban minority cohort of newborn babies and their mothers, levels of chlorpyrifos in personal air and blood samples were substantially decreased from 1998–2002, and correlations between chlorpyrifos exposure levels and decreased birth weight/length observed in 1998 were no longer apparent in 2002. For atrazine, risk communication efforts were critical in refocusing public perception of potential risks away from long-term cancer concerns (the focus of past risk assessments) and toward non-cancer risks to susceptible populations.

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